DEPARTMENT OF TRANSPORTATION
District 12
3337 MICHELSON DRIVE, SUITE 380
IRVINE, CA 92612-8894
PHONE (949) 724-2007
FAX (949) 724-2019
TTY 711 or (949) 756-7813

Flex your power!
Be energy efficient!

January 7, 2008

Tay Dam
Federal Highway Administration
650 Capital Mall, Suite 4-100
Sacramento, California 95814

Dear Mr. Dam:

The California Department of Transportation (Department) reviewed the September 2007 version of "An Alternative to the Proposed Foothill South Toll Road; The Refined AIP Alternative", a report prepared by Smart Mobility, Inc. (SMI Report) in collaboration with Philip Williams & Associates, Ltd., ORW Inc., and Oman Analytics. The Department finds that the SMI Report and its conclusions are not supported by adequate engineering and technical analysis.

The SMI Report proposes refinements to the Transportation Corridor Agencies' Arterial Improvement Plus (AIP) Alternative to reduce right of way impacts associated with the AIP alternative and states that the SMI Report alternative is functionally identical to the AIP.

The SMI Report does not provide supporting analysis for traffic capacity, traffic operations, application of standards and practicality of horizontal and vertical geometric design, and fails to address cumulative infrastructure impacts (such as utilities), construction staging impacts and other constructability concerns. Attachment "A" details Department concerns specifically related to missing interchange details and missing traffic performance information in the SMI Report alternative. The alternative presented in the SMI Report does not meet Department standards, and in our view does not meet applicable engineering standards of care. Therefore, the Department cannot support the proposed design refinements or conclusions.

Please call me at (949) 440-3440 or Lisa Ramsey, Office Chief/Corridor Project Manager at (949) 724-2102 if you have additional questions on the information provided herein.

Sincerely,

CINDY QUON
Director
District 12

Attachment

c: J. Beil, Caltrans
L. Ramsey, Caltrans
T. Margro, TCA
D. Lowe, TCA

Although not a comprehensive list, following are some California Department of Transportation (Department) concerns and comments concerning the Smart Mobility Report (SMI Report) dated September 2007.

1. The Interchange Detail Sheets, also described as Interchange Area Concepts, show interchanges with only minimum associated right of way impacts. The proposed Interchange Detail Sheets show that Department Single Point Interchange (SPI) Guidelines and Department Highway Design Manual (HDM) guidelines are not accurately represented. Therefore, interchange right of way impacts identified in the SMI Report appear to be misrepresented due to the following:

    a. *El Toro Interchange:*
        i. The right turn on ramp alignments from El Toro road do not merge safely with the main segment of the onramps, and are not in conformance with design standards.
        ii. Detail concept drawings are missing the following details: merge, storage, auxiliary lanes and shoulders.
        iii. The I-5 undercrossing would require complete reconstruction to provide proper vertical clearances and horizontal sight distances.
        iv. Impacts associated with vertical clearances and necessary profile changes are not shown.
        v. Minimum distance between ramp intersections and local road intersections are not met.

    b. *La Paz and Oso Parkway, and El Camino Real Interchanges:*
        i. Horizontal and vertical geometric data is not provided in the report and impacts cannot be ascertained.

    c. *Crown Valley Parkway Interchange:*
        i. The right turn on ramp alignments from Crown Valley Parkway do not merge safely with the main segment of the on ramps, and are not in conformance with design standards.
        ii. It is unclear how the southbound off ramp flyover gets under Crown Valley Parkway and has the required vertical clearance over the I-5 freeway; and then is able to span the northbound ramps and touch down in just a few hundred feet just prior to the intersection. Or, if the southbound off ramp flyover goes over Crown Valley parkway, then the ramp will need to start further back to achieve an acceptable profile. These impacts are not clearly shown.
        iii. Required auxiliary, merge and storage lanes, and shoulders are missing.

iv. Southbound off ramp merge conflicts with signalized interchange. Potential weave related issues are not addressed. Merge lane ends at existing right turn only lane.
v. Access Control is not attainable without removal of adjacent intersection. This would have additional impacts, including re-routing traffic and increasing traffic in other locations.
vi. The profile of Crown Valley would need to be raised if a ramp flyover or SPI were installed (which would require the reconstruction of both Camino Capistrano and Crown Valley Parkway). Associated traffic impacts not identified.
vii. Horizontal curve hidden by Crown Valley over crossing and horizontal curves following vertical crests created. Associated sight distance restrictions are not addressed.
viii. Reverse curves should provide adequate tangent section for superelevation transitions.
ix. Horizontal and vertical geometric data and/or assumptions are not provided in the report.
x. Length of southbound off ramp requires a second passing lane (HDM 504.3).
xi. Side slopes are not identified (HDM 304.1)

d. *Ortega Highway Interchange:*
i. The detail concept drawing is missing dedicated right turn lanes; and merge, auxiliary, and storage lanes and shoulders.
ii. The right turn on ramp alignments do not merge safely with the main segment of the onramps, and are not in conformance with the design standards.
iii. Impacts associated with vertical clearances and necessary profile changes are not shown.
iv. Minimum distance between ramp intersections and local road intersections are not met.

e. *Pico Interchange:*
i. The concept drawing is missing the following: dedicated right turn lanes on Pico; and merge, auxiliary, storage lanes and shoulders.
ii. The right turn on ramp alignments do not merge safely with the main segment of the onramps, and are not in conformance with the design standards.
iii. Pico is on a horizontal curve. The horizontal curve will make it difficult for the driver to determine the proper lane as the driver approaches the intersection.

iv. Impacts associated with vertical clearances and necessary profile changes are not shown.

2. The SMI Report claims that "The interchange designs as shown for the AIP-R alternative provide sufficient capacity to serve the I-5 interchange ramp volumes cited in the Supplemental Environmental Impact Report…" However, the SMI Report does not provide any SPI level of service analysis for review. The SPIs would not provide similar levels of service as the interchange designs listed in TCA's Traffic and Circulation Technical Report, Table E-40 for AIP. The following is a rough assessment of the Table E-40 AIP traffic numbers and levels of service, and how the traffic volumes may be reflected in an SPI.

   Pico/I-5: southbound direct and loop on ramp PM peak hour volumes of 370 and 1410 provides level of service A and E respectively. If a SPI or diamond interchange were provided, then the combined peak hour volumes of 1780 vehicles provide a level of service F.

   Crown Valley/I-5: northbound direct and loop on ramp PM peak hour volumes of 1810 and 900 provides a level of service F and D respectively. If an SPI or diamond interchange were provided, then the combined volumes of 2710 cars provide a level of service F. The AM Peak hour volumes for northbound direct on ramp and northbound loop on ramp of 1570 and 720 provide level of service F and B respectively. If an SPI or diamond interchange were provided, then the combined peak hour volumes of 2290 vehicles provide a level of service F.

   Ortega/I-5: northbound direct and loop on ramp PM peak hour volumes of 1720 and 800 provide level of service F and A respectively. If an SPI or diamond interchange were provided then the combined volumes of 2520 vehicles provide a level of service F. Southbound off ramp PM peak hour level of service is at Level of service F and E with mitigation.

   The Department typically manages mainline I-5 freeway traffic by metering on ramps along the entire corridor. The affected on ramps should have adequate storage in order to accommodate vehicles queued up behind ramp meters without disrupting traffic on the local arterials. The Interchange details shown in the SMI report do not reflect any additional widening required for ramp storage capacity, which may have led to an incorrect assessment of right of way impacts.

   Ramp meters should meet various criteria to perform effectively. For example, vehicle storage capacity estimates for metered ramps of between 5 and 10 percent of ramp volumes are recommended. For a single lane metered ramp, a 4-second cycle (allowing for a discharge rate of 900 VPH (vehicles per hour)) is the most rapid cycle

recommended. Similarly, for a 2 lane metered ramp, a 6-6.5 second cycle (allowing for a discharge rate off 1100 VPH) is the most rapid recommended rate. Furthermore, when ramp volumes exceed 1500 vph, a 1000' minimum length of auxiliary lane should be provided beyond the ramp convergence point. For example, an on ramp with volumes similar to northbound Ortega, with 2500 vph volume would have 42 vpm (vehicles per minute) arrival rate while discharging @ 18 vpm; thereby causing the entire peak hour traffic to queue. Therefore, the proposed SPI design with single on-ramp will not provide the required storage capacity needed for safe and effective operation of ramp meters.

3. An interchange is expected to operate at an acceptable level of service based on forecasted traffic volumes for 20 years after construction. The traffic and circulation numbers from the AIP alternative show how the traffic level of service performs with partial cloverleaf interchanges. There is no technical analysis in the SMI Report that shows SPI level of service and operational performance. Partial cloverleaf interchanges provide better capacity over other interchange types due to the advantage of having two on ramps (loop and direct onramps), which offer more capacity and better traffic management. With partial cloverleaf interchanges, left-turn movements from crossroads are eliminated thereby permitting two phase operation at signalized ramp intersections versus the three phase SPI cycle.

4. The 2001 Department Single Point Interchange Planning, Design, and Operations Guidelines (Guidelines) provide guidance to exercise sound judgment in the selection of interchanges. Interchange choices should never be prejudiced, and if SPIs are applicable in candidate locations, the Department's SPI Design Guidelines should be followed to bring *concept proposals* forward for *conceptual approval*. Design issues should be resolved as early in the environmental phase as possible, and not in later stages of engineering.

   Unlike other interchange types, the Department's SPI guidelines require SPI concept approval from our Headquarters Chief of Design and Traffic Operations Divisions for the limited use of SPI's due to the specific risks and concerns with performance, safety, operations, and capacity.

   The following bullet points represent Department concerns (identified from SPI Guidelines) for the placement of SPI's on I-5 that must be reviewed and vetted prior to potential inclusion as a viable alternative.

   a. Capacity: In urban settings, the local road system is often the controlling factor for overall system capacity. When adequate storage length cannot be provided the capacity advantages of the SPI diminish due to the close proximity of adjacent local intersections. Intersection spacing becomes even more critical because all stopped traffic must be stored between the near stop bar and the adjacent intersection. Short

spacing from the ramp intersection to the adjacent local streets and driveways will limit the ability for the local street system to handle the large volumes of through traffic that the SPI can deliver. The purported advantages of the SPI will often not materialize where the local street system is not compatible. These are concerns for I-5 at El Toro, Ortega, and Crown Valley Pkwy.

b. Traffic Operations: The size of SPI intersections necessitates a long traffic signal clearance interval for all moves. The all-red clearance interval represents dead time to the signal timing cycle, which reduces capacity and efficiency. Under moderate to heavy traffic demands, SPIs require longer signal cycle lengths to maximize operations. SPIs may not operate efficiently when the traffic volumes along legs of the intersection are unbalanced. This condition exists at Crown Valley, Ortega, and other interchanges along the corridor. Bicycles and pedestrians adversely affect the capacity and operation of motor vehicles at SPI intersections, thereby negating the benefits of an SPI over another interchange alternative with high volumes of pedestrians and bicyclists. Because traffic signals at SPI intersections are timed to move motorists efficiently through the intersection, pedestrians normally can only cross a portion of the intersection in a single cycle. Therefore, it may take a pedestrian as many as four cycles to cross the separate ramps. These are concerns for I-5 at Pico and El Toro.

c. Geometrics (vertical and horizontal alignment): SPIs are best suited for under crossings since it is difficult to provide good geometrics at over crossings. Off ramps on ascending grades are particularly prone to directing headlights into opposing exit ramp driver's eyes. SPI guidelines state that when the local street alignment is curved, it may be difficult for the driver to determine the proper lane as they approach the SPI intersection. Corner sight distance is a problem at off ramps when the cross street is skewed as it is important to provide visibility between off ramp traffic and cross traffic approaching from the left. These are concerns for I-5 at El Toro, Pico, Ortega, and Crown Valley.

d. Construction: Stage construction will be very costly and challenging. In every instance, the profile of the mainline I-5 would be reconstructed to achieve safe sight distance for the mainline and ramps. The I-5 structures will also require reconstruction. Temporary structures would be required to stage the reconstruction significantly adding to the cost of the project and traffic impact to the motorists. Managing the traffic for the high traffic volume on I-5 freeway and local streets during construction period would be a major undertaking and a huge impact to motorists. In addition, any future expansion of an SPI would be extremely difficult and costly.

e. Utility and other easement issues: Utility relocations and utility or other easement issues that may impact right of way have not been identified.

5. The SMI Report (page 11) reports the incorrect number of existing and future I-5 improvements for the AIP alternative and as such provides fewer lanes in the SMI Report than the AIP alternative. The SMI Report also proposes fewer lanes on several Secondary Master Planned Arterial Highways adjacent to I-5. One arterial is El Camino Real, which is the only local arterial through San Clemente. These impacts negatively affect the SMI Report alternative level of service and require evaluation.

6. The SMI Report proposes elimination of northbound off ramps and on ramps at I-5/El Camino. The elimination of these ramps is in conflict with Federal Highway guidelines, which require full service interchanges for return movements if drivers mistakenly exit the freeway. The SMI Report needs to address the impact to local traffic circulation.

7. All extended detention basins (EDB) must meet Department approved Statewide Management Plan (SWMP) guidelines, which provide for EDBs to be constructible, maintainable and effective in removing pollutants using appropriate location and design criteria. SMI has proposed placement of EDBs in steep slopes above the freeway and ramps, or underground in adjacent privately owned parking areas. SMI's placements of EDBs do not meet SWMP guidelines.

8. The SMI Report notes *"...only properties in which building structures would have to be removed are considered displacements"* and despite not being listed "*acquisition of additional small portions of properties may be required.*" Displacements relating to buildings and structures should be clarified more accurately as full-take and part-take acquisitions.

9. The interchange detail drawings lack accurate standard horizontal and vertical geometric details necessary to make right-of-way impact assessments.

10. The SMI Report 2005 data for business and residence acquisition costs are unrealistic given the dynamic real estate values in the area.

11. Page vi, first paragraph states that "Nearly all of the widening of the I-5 can be completed within the existing I-5 right of way". Contrary to this statement, we could not identify any excess R/W to be used for the proposed widening at the following locations: El Toro Road to Alicia Parkway; PCH to San Juan Creek Road; SB I-5, north of Avery Pkwy; SR-73 to Junipero Serra.

12. It appears that where right of way was not available, ramp closures (NB I-5 El Camino Real off and on ramps), lane reductions (on secondary arterials), and reduced lane and

shoulder widths were proposed without evaluating the impact. This ignores the Department's mandatory design standards.

13. The SMI Report did not factor in the cost of retaining walls along the I-5 and for the reconstruction of the entire I-5/SR-73 interchange needed for this widening.

14. Page 7, 2nd paragraph states, "This listing of these improvements in the LRTP provides a much clearer path for funding of these improvements than is suggested in the SEIR". The Orange County Long-Range Transportation Plan (LRTP) includes the toll road, funded through the Toll Road program and bonded against future tolls, as a baseline. Therefore, the funding for these additional capacity improvements has not been identified.

15. Page 7; last paragraph states that "*The major design components of the AIP Alternative, such as lane width, conform to the AASHTO standards*". As noted in Section 82.3 of the Highway Design Manual (HDM), "AASHTO policies and standards, which are established as nationwide standards, do not always satisfy California conditions. When standards differ, the instructions in the HDM govern, except when necessary for FHWA approval."

16. Page 18 shows the proposed SPI for Ortega Highway. Redesign and reconstruction of this interchange is currently under consideration by the Department.

17. The SMI Report proposes to replace several interchanges along the I-5 with SPIs without considering geometric constraints, operational and safety impacts (i.e. close proximity of local intersections and pedestrian safety).

18. SPI design is usually considered as an alternative for tight diamond interchange.

19. SMI asserts that "*traffic performance of the carpool lane/surface street improvement alternative*" SMI proposes "*has been validated by TCA's own consultants,*" and that "*AIP-R alternative outperforms the toll road in relieving congestion.*" The SMI Report makes this claim by stating that the AIP and SMI Report alternatives are *"functionally"* identical with the exception of the interchanges and assumes the benefits from the AIP alternative provided from prior TCA traffic studies without additional study. The SMI Report does not provide supporting analysis that demonstrates how the alternatives are functionally identical.

20. The Department's June 21, 2006 letter to Federal Highway Administration (attached) affirms TCA's "adequate and defensible" modeling methodologies and TCA's appropriate application of minimum Department Design Standards when comparing alternatives.

21. The Department will not provide comments on the arterial component of the SMI Report alternative, as this is a local agency issue.

22. The SMI Report includes excerpts from the 2006 Orange County Long-Range Transportation Plan (LRTP) that describe "*improvements proposed for the I-5 corridor, many of which were also included in the AIP alternative.*" The SMI Report's excerpts are not comprehensive references to the LRTP to provide full information. The SMI Report fails to fully acknowledge that the completion of the southern portion of the Foothill Transportation Corridor and widening of the toll road system to its planned ultimate width (Eastern/Foothill Transportation Corridor Agency Project) plays a significant role in the LRTP baseline. As such, the right of way impacts related to the LRTP Interstate 5 improvements would be less than the AIP alternative because they do not provide the same capacity benefits. The Department is working with the South Orange County Major Investment Study team that is evaluating the current and future needs of traffic demands in south Orange County. Initial traffic studies show that a significant multi-modal capacity increase is required on I-5 in addition to the benefits provided from the toll road.